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A NOTE ON THE BIOLOGY AND DISTRIBUTION OF *MASTOTERMES DARWINIENSIS* FROGGATT

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Introduction

Most Top End residents sooner or later become aware of the so-called 'Giant' termite, *Mastotermes darwiniensis* Froggatt. The damage caused by this species is well documented (Hill 1942; Gay and Calaby 1970), but although some authors (Ratcliff, Gay and Greaves 1952; Gay 1970) have commented that it is absent from some soil types, no explanation of its particular distribution has been offered.

M. darwiniensis is the sole living representative of the family Mastotermitidae, of which fossil genera have been found in Europe,

North and South America and Australia. The family is regarded as being primitive, having diverged early from an ancestral termite line derived from the cockroaches.

Present Distribution

Mastotermes is generally distributed across tropical Australia with its southern limit approximating the Tropic of Capricorn. However, there are some puzzling aspects of its distribution within this broad range. Some of the gaps in its known distribution may be due to lack of collections and some, for example the Great Sandy Desert, due to lack of suitable habitat. A large area of Cape York Peninsula, however, appears to be perfectly suitable, with similar vegetation and soils to equivalent latitudes in the Northern Territory. Despite the similarity, particularly of the *Eucalyptus tetrodonta* dominated open forests, *Mastotermes* does not occur much further north than Laura.

In Western Australia, north of the Tropic, *Mastotermes* does not occur west of 116°30'E (apart from one record which will be discussed later).

A possible explanation of the present distribution of *Mastotermes*, and its seemingly disproportionate destructiveness in relation to man-made structures and crops, is based on ancient sea levels and our limited knowledge of the biology of the species in its natural habitat.

Biology

In undisturbed areas, *M. darwiniensis* co-exists with as many as 25 other species of termites, although only two or three of these feed on sound wood and could be regarded as competitors for food. The most important competitor is *Coptotermes acinaciformis* (Froggatt), whose range extends over most of Australia.

C. acinaciformis colonies are founded by alate pairs, usually at the base of a tree, and in Northern Australia older colonies build conspicuous mounds which, although originating in or next to the base of a tree, stump, or log, may be free-standing after the original food source has been consumed. Such colonies are headed by the original pair of reproductives, the enormously distended, relatively immobile queen and the king being housed in a special chamber at about ground level near the centre of the nest. Each colony feeds in a number of trees, logs, etc. at various distances from the nest (Greaves 1959).

In undisturbed areas, *Mastotermes* forms relatively small colonies which occupy about the same space as a *C. acinaciformis* colony in the same area. The nest is usually below ground level at the base of the tree. Although laboratory trials have shown that *Mastotermes* is capable of founding colonies with alate pairs, it is extremely rare to find colonies headed by such pairs, only one first form reproductive having been recorded, and that from a man-made structure rather than in native forest (Hill 1942). Colonies are instead headed by large numbers of neoteinic reproductives; these are workers which have the reproductive organs and functions of adults but which have few other adult characteristics. *Mastotermes* is capable of producing such reproductives in relatively small groups of workers and under favourable conditions, such as an increased food supply, the colony could be rapidly increased in size by turning numbers of workers into neoteinics and thus increasing its reproductive capabilities. In this respect, the theoretical age of a colony is infinite.

I believe that competition from other species, in particular *C. acinaciformis*, generally restricts the size and abundance of *Mastotermes* colonies in undisturbed forests.

Although *C. acinaciformis* is capable, under favourable conditions, of producing neoteinic reproductives after the loss of the queen, clearing of an area usually totally removes the population. In contrast, *Mastotermes*, even if all existing nests are destroyed and no reproductives escape, is capable of forming new colonies from isolated groups of workers existing in woody material left in the soil, and can persist in cleared land for at least several years.

For long periods at various times in the geological history of Australia, parts of the present land mass have been submerged. These include most of Cape York Peninsula and the Western Pilbara. The family Mastotermitidae has existed in Australia since the Eocene at least (Krishna 1970). I suggest that *Mastotermes*, because it may have lost the ability to establish new colonies from alate pairs under field conditions, and under competitive pressures from other species, has been unable to extend its range into areas which became available when sea levels fell.

Human influence on the environment is advantageous to *Mastotermes* in several ways. Clearing, which removes competition in the form of *Coptotermes*, is usually followed by provision of a food source such as crops, fences, or buildings. As discussed above, these are optimum conditions for *Mastotermes* expansion. Colonies may also

be transported, in poles or girders for example, or even in firewood. The species was introduced to Lae, Papua New Guinea, and I suspect that some of the records for Australian localities, eg. Onslow in W.A. (the record mentioned above) and Karumba in Queensland, are introductions also. They are in any case associated with population centres rather than undisturbed native forest.

It seems then, that *Mastotermes*, a relict species only able to compete with more advanced families by its particular reproductive strategy, and whose range may even be shrinking in undisturbed areas, has become a destructive pest under man's influence.

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